

REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-8, 10-13, 16, and 18-21 and 24 are currently pending, Claims 1 and 2 having been amended, Claim 24 having been added, and Claims 3, 4, 6, and 7 having been previously withdrawn from consideration. The changes and additions to the claims do not add new matter and are supported by the originally filed specification, for example, on page 10, line 24 to page 11, line 13; page 14, line 5 to page 15, line 10; and Fig. 3A.

In the outstanding Office Action, Claims 1, 2, and 5 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada et al. (JP 63-037621, hereafter “Yamada”) in view of Watt et al. (WO 90/20517, hereafter “Watt”); Claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Watt and Armistead (U.S. Patent No. 5,838,759); Claims 10, 12-13, 16, 18, 20, and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Watt, Armistead and Cluzeau (French Patent Application FR 2 738 669); Claims 11 and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada in view of Watt, Armistead, Cluzeau, and Kassing (German Patent Application DE 3049153 A1).

With respect to the rejection of Claim 1 under 35 U.S.C. §103(a), Applicant respectfully traverses this ground of rejection in part and further submits that the clarifying amendment to Claim 1 overcomes this ground of rejection. Amended Claim 1 recites, *inter alia*,

a plurality of neutron emissive parts being formed of a hydrogen fixing material within which hydrogen and anthropogenic tritium nuclei are fixed, the neutron emissive parts being configured to emit neutrons when subject to bombardment with particles; and

a plurality of neutron non-emissive parts which are juxtaposed to the neutron emissive parts and which not

being fixed with hydrogen and anthropogenic tritium nuclei, the neutron non-emissive parts not being configured to emit neutrons when subject to bombardment with particles,

wherein said plurality of neutron emissive parts are arranged in relation to the neutron non-emissive parts in the formation of a non-uniform pattern as a coded mask and are collectively configured to emit a neutron flow including plural neutron beams coded by the pattern of the mask when subject to bombardment with particles.

Yamada is directed to a method of manufacturing an X-ray mask. Figs. 1a-1c of Yamada shows a boron nitride carbide hydride film 5 being used, which the Office Action interprets as corresponding to the claimed “neutron emissive parts.” (See Office Action, at page 2). Yamada also describes an X-ray absorber which is formed through a plating base 4, which the examiner interprets as corresponding to the claimed “non-emissive parts.” Applicant notes that Fig. 1d of Yamada shows the X-ray mask in its finished form, where transmitting membrane 3 is locally exposed through openings in a gold layer 8. However, Fig. 1d does not show the boron nitride carbide hydride film 5, which was removed in the process of making the X-ray mask. Also, the remaining portions of plating base 4 are masked by the gold layer 8 in the final mask shown on Fig. 1d. Therefore, it appears that the examiner interprets the structure shown in Fig. 1b, which includes the boron nitride carbide hydride film 5 as corresponding to the “target” previously recited in Claim 1.

The Office Action acknowledges that Yamada fails to disclose or suggest neutron emissive parts that contain anthropogenic tritium, as defined in previous Claim 1.

Accordingly, Applicant submits that Yamada also fails to disclose or suggest “a plurality of neutron emissive parts *being formed of a hydrogen fixing material within which hydrogen and anthropogenic tritium nuclei are fixed,*” as defined by amended Claim 1.

The Office Action relies on Watt to remedy the deficiencies of Yamada with regard to Claim 1 (see Office Action, at pages 3-4).

Watt describes the use of a high energy light ions beam for exposing and patterning a resist layer 1 (see page 5, and Fig. 1a). Figs. 3a and 3d of Watt show an embodiment having a metal layer 4 under the resist layer 1. Watt describes that the patterned areas of the resist layer 1 are developed and voids are created in the resist layer. Metal is electroplated to fill the void, and with an appropriate energy, the ions can penetrate into the metal layer 4 (see page 7, last paragraph). In patterning the resist, Watt describes that the high energy light ions beam could be a tritium ions beam (see page 5 of Watt).

The Office Action appears to take the position that in Watt, after the penetration of the tritium beam in the resist layer creates the exposed areas, that “some of the tritium unavoidably remains in outside but in the periphery of the exposed area.” (See Office Action, at page 4).

Therefore, it appears that the Office Action is suggesting that Yamada could be modified based on the teaching of Watt, such that the tritium ions beam of Watt is used to pattern the structure of Yamada, and thus leave tritium ions on or around the boron nitride carbide hydride film 5 of Yamada (as the interpreted emissive parts), and thus achieve neutron emissive parts that contain anthropogenic tritium as was previously defined in Claim 1.

However, even if the tritium ions beam of Watt is used on the structure of Yamada as suggested by the examiner, Applicant respectfully submits that this would not result in having neutron emissive parts *within which hydrogen and anthropogenic tritium nuclei are fixed*. The examiner has asserted that using the tritium ions beam of Watt “unavoidably” leaves some of the tritium “in outside but in the periphery of the exposed area.” However, Applicant submits that having some amount of tritium remain on a material is not the same as

fixing the tritium nuclei within the material. Applicant submits that one of ordinary skill in the art understands that the meaning of ***fixing*** elements within a material is different than trace amounts of tritium being left behind after an ion beam is used to pattern a material.

Furthermore, Applicant submits that neither Yamada nor Watt explicitly discloses ***fixing hydrogen*** in the hydrogen fixing material as defined by amended Claim 1.

Therefore, Applicant respectfully submits that the combination of Yamada and Watt clearly fails to disclose or suggest “a plurality of neutron emissive parts being formed of a hydrogen fixing material within which hydrogen and anthropogenic tritium nuclei are fixed,” as defined by amended Claim 1.

Armistead, Cluzeau, and Kassing have been considered but fail to remedy the deficiencies of Yamada and Watt with regard to amended Claim 1.

Thus, it is respectfully submitted that amended Claim 1 (and all associated dependent claims) patentably distinguish over Yamada, Watt, Armistead, Cluzeau, and Kassing, either alone or in proper combination.

With respect to new independent Claim 24, Claim 24 recites, *inter alia*,

A system comprising:

a particle accelerator which includes an ion source
and a target, the target comprising:

a plurality of neutron emissive parts being
formed of a hydrogen fixing material within which
hydrogen and anthropogenic tritium nuclei are fixed, the
neutron emissive parts being configured to emit neutrons
when subject to bombardment with particles; and

a plurality of neutron non-emissive parts
which are juxtaposed to the neutron emissive parts and not
being fixed with hydrogen and anthropogenic tritium
nuclei, and which do not emit neutrons when subject to
bombardment with particles,

wherein said plurality of neutron emissive
parts being arranged in relation to the neutron non-emissive
parts so as to form a non-uniform pattern as a coded mask

and being collectively configured to emit a neutron flow including plural neutron beams coded by the pattern of the mask when subject to bombardment with particles;

an image plane; and

an object located between the particle accelerator and the image plane,

wherein the ion source is configured to bombard the target with particles and the plurality of neutron emissive parts of the target are configured emit the neutron flow, in response to being bombarded with the particles, through a point on the object and onto the image plane.

Applicant submits that the applied art fails to disclose or suggest these features of new Claim 24. In particular, Applicants submit that the Yamada, Watt, Armistead, Cluzeau, and Kassing fail to disclose or suggest a “target” as defined in Claim 24, for similar reasons as discussed above for the “target” of amended Claim 1.

Furthermore, with regard to dependent Claim 8, Applicant notes that the Office Action acknowledges that Yamada and Watt fail to disclose or suggest a target as defined in Claim 1 as being included in a particle accelerator. (See Office Action, at page 5).

Applicant notes that the Office Action had relied on Armistead to remedy the deficiencies of Yamada and Watt with regard to a target being included in a particle accelerator.

Armistead is directed to a single beam photoneutron probe and X-ray imaging system for detecting contraband in a cargo container. Fig. 1 shows a system in which a X-ray source 14, which is a commercially available linear accelerator generates an X-ray beam towards a detector array 18 with the cargo container located between them (see col. 4, lines 14-21). Armistead describes that the detector 18 takes a snapshot of X-ray attenuation in the container to give a picture of contents in the container (see col. 5, lines 18-26). Armistead also describes that neutrons penetrating the container can be absorbed by certain elements which may then give off gamma rays of characteristic energy, and that there are gamma ray

detectors 24 disposed around the container (see Fig. 1) to analyze the gamma rays and detect the presence and amounts of various elements (see col. 5, line 60 to col. 6, line 1).

First, while Armistead does describe using a particle accelerator directed towards an object, and even if it would be obvious to include a “target” in the particle accelerator of Armistead, Armistead still does not disclose or suggest “*an image plane*; an object located between the particle accelerator and the image plane, wherein the ion source is configured to bombard the target with particles and the plurality of neutron emissive parts of the target are configured emit the neutron flow, in response to being bombarded with the particles, through a point on the object and onto the image plane,” as defined by new Claim 24.

Additionally, Applicant respectfully submits that one of ordinary skill in the art would not even insert the X-ray mask of Yamada in view of Watt into the accelerator 14 of Armistead at a point where it is bombarded by particles. Applicant submits that one of ordinary skill in the art knows that an X-ray mask as described by Yamada is placed between an X-ray source and a substrate for *absorbing* X-rays generated by an X-ray source. Therefore, Applicant submits that there is no reasonable rationale to include the X-ray mask of Yamada in view of Watt inside the particle accelerator at a point where it will be bombarded by particles which is prior to the point where the X-rays will be generated.

Also, the Office Action relies on Fig. 1b of Yamada which has the boron nitride carbide hydride film 5, which the examiner interpreted as being the “neutron emissive parts.” However, as discussed above, this the boron nitride carbide hydride film 5 is removed prior to producing the final X-ray mask shown in Fig. 1d of Yamada. Therefore, the Office Action has failed to show why one of ordinary skill in the art would take the *incomplete* X-ray mask shown in Fig. 1b and insert it into a particle accelerator.

For at least the reasons discussed above, Applicant respectfully submits that Yamada in view of Watt and Armistead fails to disclose or suggest a particle accelerator which includes the claimed “target” as recited in dependent Claim 8 and new Claim 24.

Additionally, Applicant respectfully submits that even if the incomplete X-ray mask structure of Fig. 1b were to be arbitrarily placed within the particle accelerator at point where it would be bombarded by particles, the X-ray mask would not be a target configured to emit a neutron flow in response to being bombarded with the particles through a point on an object external to the accelerator and onto the image plane which is beyond the object. As discussed above, the examiner is relying on a trace amount of tritium somehow being present on the boron nitride carbide hydride film 5 of Yamada after use of a tritium beam described in Watt. However, there is no showing at all that the boron nitride carbide hydride film 5 of Yamada with this trace amount of tritium would constitute a structure sufficient to emit a neutron flow, in response to being bombarded with particles, through a point on an object external to the particle accelerator and onto an image plane which is beyond the object.

MPEP §2142 states:

The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 82 USPQ2d 1385, 1396 (2007) noted that **the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit**. The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, **there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness**." In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). (Emphasis added).

For all the reasons discussed above, Applicant respectfully submits that there is no rational reason that Yamada, Watt, and Armistead would be combined to achieve a system comprising: “a particle accelerator which includes an ion source and a target, the target

comprising: a plurality of neutron emissive parts being formed of a hydrogen fixing material within which hydrogen and anthropogenic tritium nuclei are fixed, the neutron emissive parts being configured to emit neutrons when subject to bombardment with particles; and a plurality of neutron non-emissive parts which are juxtaposed to the neutron emissive parts and not being fixed with hydrogen and anthropogenic tritium nuclei, and which do not emit neutrons when subject to bombardment with particles, wherein said plurality of neutron emissive parts are arranged in relation to the neutron non-emissive parts so as to form a non-uniform pattern as a coded mask and are collectively configured to emit a neutron flow including plural neutron beams coded by the pattern of the mask when subject to bombardment with particles; an image plane; an object located between the particle accelerator and the image plane, wherein the ion source is configured to bombard the target with particles and the plurality of neutron emissive parts of the target are configured emit the neutron flow, in response to being bombarded with the particles, through a point on the object and onto the image plane,” as defined by new Claim 24.

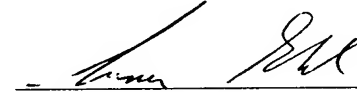
Cluzeau and Kassing have been considered but fail to remedy the deficiencies of Yamada, Watt, and Armistead with regard to new Claim 24.

Thus, it is respectfully submitted that new Claim 24 patentably distinguishes over Yamada, Watt, Armistead, Cluzeau, and Kassing, either alone or in proper combination.

Consequently, in light of the above discussion and view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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